

C-A OPERATIONS PROCEDURE MANUAL

C-A TPL 03-07 TEMPORARY PROCEDURE FOR RHIC OPERATION WITH ROMAN POTS

Text Pages 2 through 6

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Assoc. Chairman for Safety Date

P. Ingrassia

C-A TPL 03-07 TEMPORARY PROCEDURE FOR RHIC OPERATION WITH ROMAN POTS

1. Purpose

- 1.1 The purpose of this procedure is to outline, for the MCR Operators and Operations Coordinators (OCs), the constraints on the operation of the eight Roman Pots in RHIC (upper and lower pots 57 and 59 meters on either side of IP2). This procedure restricts:
 - 1.1.1 the operation of the Roman Pot drives to pp2pp experimenters AFTER they have received permission from the Operations Coordinator to drive the pot.
 - 1.1.2 the adjustment of the motor drive stops to the pp2pp Liaison Engineer.
 - 1.1.3 the setting of the NMC threshold for the beam permit system to the cognizant physicist.
 - 1.1.4 the setting of the RHIC Beam Permit Link masks to the RHIC Liaison Physicist.
 - 1.1.5 the operation of the Roman Pot drives if the NMC protection system is not working
 - 1.1.6 who may hold the four “permissive keys” for roman pot drive operation.
- 1.2 This procedure is to be used whenever the Roman pots are driven towards the circulating proton beam in RHIC.
- 1.3 The Roman Pots are detectors used by the pp2pp experiment in RHIC. They are physically driven in to a position close to the circulating beam. For FY'03 four Roman Pot “stations” are installed (2 in yellow and 2 in blue) on either side (57m and 59 m) of IP2. Each active station contains two (an upper and a lower) Roman Pots.

2. Responsibilities

- 2.1 The Operations Coordinator (OC) is responsible to give permission to operate the Roman Pot drives after the RHIC beams are stored and no significant vertical tuning is planned in either ring. The OC shall hold the permissive keys for normal “high intensity” RHIC operation.
- 2.2 The pp2pp Liaison Engineer is responsible to set the mechanical and electrical stops for the Roman Pot drives.
- 2.3 The RHIC Liaison Physicist is responsible for establishing the Roman Pot drive outer limit as inputs to the beam permit system and for masking and unmasking the inputs to the RHIC Beam Permit Link. Once the inputs are MASKED the pots will be unable to move.
- 2.4 The cognizant engineer and Experiment Liaison Physicist shall set the threshold for the NMC units used to abort the beam.
- 2.5 The MCR Group Leader (MCRGL) shall set the RHIC beam current transformer alarm limit for pp2pp low intensity operation.

3. Prerequisites

- 3.1 The physical (electrical) limits for the Roman Pot drive positions have been set by the Liaison Engineer for the pp2pp experiment. The limits are set for 6 mm for low intensity (close-in operation) and 20 mm for high intensity operation. The distances refer to how close the pot can get to the center line.
- 3.2 The threshold for the NMC monitors has been initially set to 100 Rad/hr in order to pull the permit link .
- 3.3 The Roman Pot drive limits are enabled as inputs to the RHIC beam permit system and the appropriate masks are set.
- 3.4 The target group for this procedure is the MCR Operators and OCs, and the RHIC liaison physicist..
- 3.5 The training requirement for this procedure is read and sign.
- 3.6 The minimum number of staff members that need to be trained in order for this procedure to be effective is three, one OC and one operator, and the RHIC liaison physicist.

4. Precautions

- 4.1 The Roman Pots shall be retracted before protons are injected.
 - 4.1.1 The LVDT readbacks should be on the order of +10V for each of the four drives found at pet/Interaction_Regions/PP2PP/RomPotCtrl/Sector1(2)/vmic3126.2d-p2pp.A.5(4,1,0)
 - 4.1.2 IF the Roman Pots are not retracted before injection then the RHIC beam permit link will prevent beam injection.

5. Procedure

Caution:

To RETRACT the Roman pots use **pet/Interaction_Regions/PP2PP/RomPotCtrl/Sector1(2)** and click **home** on each of the two steppers (X, Y) in sector 1 and sector 2. Observe “Retracted” under “at limit?” to confirm outer limit switch was picked up.

- 5.1 Pre-Operations (prerequisites) -- Before operation of the Roman Pots is allowed:
 - 5.1.1 The Accelerator Systems Safety Review Committee and Experimental Safety Review Committee checklists shall be signed in the appropriate places.
 - 5.1.2 The RHIC Liaison Physicist shall unmask inputs 1 and 3 to the RHIC Beam Permit Link at pet/RHIC/Links/Permit/2/2d-pp2pp.

Note 1:

Unmasking will force the RHIC Beam Permit to be disabled if the Roman Pots are moved from the “retract limit” position.

- 5.1.2.1. The RHIC LP shall confirm that the permit inputs for “NMC OK or pot retracted” are enabled (active) and unmasked.

- 5.1.3 The Liaison Engineer shall physically limit the travel of each of the four Pots as agreed to with the Accelerator Systems Safety Review Committee.
- 5.1.3.1 The ASSRC limits for individual pot motions are
- 20 mm from the center line during high intensity operation
 - 06 mm from the center line during low intensity operation.
- 5.1.4 The cognizant physicist and engineer shall set the thresholds for NMC monitors associated with the Roman Pots to disable the Beam Permit Link when the threshold is reached. The thresholds will be determined with the assistance of members of the ASSRC. The NMC system will be the means of protecting accelerator and experimenter equipment.
- 5.1.4.1 The inputs to the beam permit system must be tested to insure the ability of each pot to disable the beam permit.
- 5.1.4.2 The NMC thresholds may be changed with the concurrence of the RHIC Liaison Physicist and the Acting Chairman of the ASSRC
- 5.1.5 The four permissive keys for the roman pots will be held in the captured key locker in the MCR and released for the low intensity run as permitted by the ASSRC checklist.
- 5.1.5.1 Yellow do not operate tags will be placed on the keys by the pp2pp Liaison Physicist.
- 5.1.5.2 The yellow tags maybe removed after ASSRC approval for 6 mm operation

5.2 Operation

Caution:

Beam damage to the Roman Pots may occur and the RHIC vacuum may be spoiled. Should this happen, contact the Associate Chair for ESHQ and initiate a critique. This is not considered a DOE reportable occurrence.

The OC shall not give permission to drive the Roman Pots towards the center line if two or more the NMC protection systems is not working (minimum of three required).

- 5.2.1 **High Intensity RHIC Operation** (RHIC operation with Pots inserted to a position 20 mm from the beam)
- 5.2.1.1 After the beams are stored a member of the pp2pp collaboration will contact the Operations Coordinator to get permission to insert the roman pots.
- 5.2.1.2 **IF beam steering and vertical tuning is complete THEN the Operations Coordinator will disable the permit inputs AND give permission to the pp2pp experiment to drive in the pots.**

Note:

When pp2pp is running the permit inputs 1 and 3 at pet/RHIC/Links/Permit/2/2d-pp2pp will be MASKED and ENABLED

When RHIC is ramping permit inputs 1 and 3 at pet/RHIC/Links/Permit/2/2d-pp2pp will be UNMASKED and ENABLED

5.2.1.2.1 To disable permit inputs do the following:

- 5.2.1.2.1.1 Go to pet/RHIC/Links/Event
- 5.2.1.2.1.2 Verify ev-spare47 is turned on
- 5.2.1.2.1.3 Click on TRIGGER for ev-spare47
- 5.2.1.2.1.4 Middle mouse click on the cell to send the value.

5.2.1.3 IF the beam permit is lost due to an NMC interlock THEN

- 5.2.1.3.1 Review the loss monitor post mortem data
- 5.2.1.3.2 Attempt to determine the source of the problem
- 5.2.1.3.3 Consult the Run Coordinator if the problem cannot be found
- 5.2.1.3.4 Resume operation when the source of the problem is corrected.

5.2.1.4 The pots are automatically retracted by the sequencer at the end of the store.

5.2.2 **Low Intensity RHIC Operation** (RHIC operation dedicated to the pp2pp experiment with Pots inserted to a position 6mm from the beam)

Caution:

Data taken during high intensity operation will be reviewed by a subcommittee of the ASSRC before low intensity operation is permitted. The subcommittee shall approve low intensity operation with the pots at 6 mm from the beam

5.2.2.1 The MCRGL or his designee shall set the RHIC beam current transformer alarm limit for 3×10^{12} protons in each ring.

5.2.2.2 After the beams are stored in each ring the RHIC liaison physicist shall scrape the beams until no more than 3×10^{12} protons remain circulating in each ring AND the beam current transformer alarm condition is gone.

5.2.2.3 The RHIC liaison physicist shall ask the OC to release the keys to permit the pots to be driven to within 6 mm of the beam

5.2.2.4 **IF beam steering and vertical tuning is complete THEN the Operations Coordinator will disable the permit inputs AND give the keys to the pp2pp experimenters.**

5.2.2.4.1 To disable permit inputs follow the steps in paragraph 5.2.1.2.1 above

5.2.2.5 IF the beam permit is lost due to an NMC interlock then

- 5.2.2.5.1 Review the loss monitor post mortem data
- 5.2.2.5.2 Attempt to determine the source of the problem
- 5.2.2.5.3 Consult the Run Coordinator if the problem cannot be found
- 5.2.2.5.4 Resume operation when the source of the problem is corrected

5.2.2.6 The pots are automatically retracted by the sequencer at the end of the store.

5.3 Retracting the Pots

5.3.1 To drive the pots out:

5.3.1.1 Click on the **HOME** button found at
pet/RHIC/Interaction_Regions/PP2PP/RomPotCtrl/Sector1(2)

5.4 Roman Pot Inspections

5.4.1 If the beam permit is pulled due to excessive radiation levels then an inspection of the roman pots may be ordered by the ASSRC Chairman or the Liaison Engineer.

5.4.1.1 IF an inspection is ordered then the Liaison Engineer shall retract the pots and inspect them.

5.4.1.2 An ASSRC subcommittee shall participate in the inspection

5.4.1.3 The ASSRC subcommittee and the Liaison Engineer must agree that continued operation will be permitted.

6. Documentation

6.1 None

7. References:

7.1 None

8. Attachments:

8.1 None